

Technological Systems

Description:	<p>This course is intended to teach students how technological systems work together to solve problems and capture opportunities. A system can be as small as two components working together (technical system/device) or can contain millions of interacting devices (user system/network level). We often break down the macro systems into less complicated Microsystems in order to understand the entire system better. However, technology is becoming more integrated, and systems are becoming more and more dependent upon each other than ever before.</p> <p>This course will give students a general background on the different types of systems but will concentrate more on the connections between these systems. This course will give students a general background on the different types of systems, but will concentrate more on the connections between systems.</p> <p>This is the capstone middle school course and provides the foundation for future studies in a Technology Engineering Education sequence.</p>
Pre-requisites	Inventions and Innovations
Recommended Credits:	1
Recommended Grade Levels:	8 th
Course Code:	0882

TECHNOLOGICAL SYSTEMS

Standard 1.0

Demonstrate leadership, citizenship, and teamwork skills required for success in the school, community and workplace through Technology Student Association.

Standard 2.0

Safely use tools, materials, equipment and other technology resources.

Standard 3.0

Explore the key components of technological systems.

Standard 4.0

Learn how to interact with technological systems.

Standard 5.0

Analyze how technological systems evolve

Standard 6.0

Explore and demonstrate systems adjustments

Standard 7.0

Understand how the failure of a system can often have disastrous results.

Standard 8.0

Recognize and forecast trends in the development of technological systems.

TECHNOLOGICAL SYSTEMS

STANDARD 1.0

Demonstrate leadership, citizenship, and teamwork skills required for success in the school, community and workplace through Technology Student Association.

LEARNING EXPECTATIONS

The student will be able to:

- 1.1 Exhibit positive leadership skills.
- 1.2 Participate in the Technology Student Association (TSA) as an integral part of classroom instruction.
- 1.3 Evaluate school, community, and workplace situations by applying problem-solving and decision-making skills.
- 1.4 Demonstrate the ability to work professionally with others.
- 1.5 Identify personal, teamwork and leadership skills used in various occupations.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student should know and be able to:

- 1.1.1 Conduct a self-study of personal leadership and teamwork styles.
- 1.1.2 Identify and utilize the strengths of individuals to solve a problem as a team.
- 1.2.1 Explain the importance of the principles expressed in the TSA Motto and Creed.
- 1.2.2 Prepare a meeting agenda for a TSA monthly/weekly meeting.
- 1.3.1 Participate in and conduct meetings according to accepted rules of parliamentary procedure.
- 1.4.1 Participate in various TSA activities and/or competitive events.
- 1.5.1 Work with a team to develop, implement and evaluate the effectiveness of a community or school service project

SAMPLE PERFORMANCE TASKS

- Prepare a resume.
- Create a leadership inventory and use it to conduct a personal assessment.
- Participate in various TSA programs and/or competitive events.
- Evaluate an activity within the school, community, and/or workplace and project effects of the project.
- Prepare a meeting agenda for a TSA monthly/weekly meeting.
- Attend a professional organization meeting such as, Chamber of Commerce meeting.

INTEGRATION/LINKAGES

- International Technology Education Association – Center to Advance the Teaching of Technology and Science (ITEA-CATTS)
- Tech-Know Project Middle School Teacher’s Guide A
- Tech-Know Project Middle School Teacher’s Guide B
- Human Innovation Technology Series HITS
- Engineering Your Future Project Activities
- Technology Student Association Curriculum Resources Guide for Middle School and High School Events.

TECHNOLOGICAL SYSTEMS

STANDARD 2.0

Safely use tools, materials, equipment and other technology resources.

LEARNING EXPECTATIONS

The student will be able to:

- 2.1 Pass with 100% accuracy a written examination relating specifically to safety issues.
- 2.2 Pass with 100% accuracy a performance examination relating specifically to tools and equipment.
- 2.3 Maintain a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.
- 2.4 List and explain the importance of safety guidelines for TSA competitive events.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student should know and be able to:

- 2.1.1 Passes with 100% accuracy a written examination relating specifically to safety issues.
- 2.2.1 Passes with 100% accuracy a performance examination relating specifically to tools and equipment.
- 2.3.1 Maintains a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.
- 2.4.1 List and explain the importance of safety guidelines for TSA competitive events.

SAMPLE PERFORMANCE TASKS:

- Pass with 100% accuracy a written examination relating specifically to safety issues.
- Pass with 100% accuracy a performance examination relating specifically to tools and equipment.

INTEGRATION/LINKAGES

- International Technology Education Association – Center to Advance the Teaching of Technology and Science (ITEA-CATTS)
- Tech-Know Project Middle School Teacher's Guide A
- Tech-Know Project Middle School Teacher's Guide B
- Human Innovation Technology Series HITS
- Engineering Your Future Project Activities
- Technology Student Association Curriculum Resources Guide for Middle School and High School Events.

TECHNOLOGICAL SYSTEMS

STANDARD 3.0

Explore the key components of technological systems.

LEARNING EXPECTATIONS

The student will be able to:

- 3.1 Identify the parts of a mechanical system and explain how they interact with each other.
- 3.2 Understand and construct a simple electric circuit.
- 3.3 Identify and explore the basic principles involved in fluid power.

PERFORMANCE STANDARDS:

The student should know and be able to:

- 3.1.1 Identify the individual parts of a mechanical system.
- 3.1.2 Sketch a common mechanical system.
- 3.2.1 Build a simple circuit.
- 3.2.2 Identify several energy types of energy sources.
- 3.3.1 Understand the difference between hydraulic and pneumatic systems.
- 3.3.2 Identify several applications of fluid powered systems.

SAMPLE PERFORMANCE TASKS:

- Students will identify and research a specific mechanical systems problem or issue that has been influenced by advancements in technology. The students will present their findings in the form of a multimedia presentation.
- Students will demonstrate their knowledge of basic electrical and electronic theory. They will assemble a specific circuit from a schematic diagram and make required electrical measurements. Go to the TSA Zap It! Electrical Applications STEM guidelines.
- Students in teams will research hydraulic and pneumatic systems and present their differences using desktop publishing and creating a brochure.

INTEGRATION/LINKAGES

- International Technology Education Association – Center to Advance the Teaching of Technology and Science (ITEA-CATTS)
- Tech-Know Project Middle School Teacher’s Guide A
- Tech-Know Project Middle School Teacher’s Guide B
- Human Innovation Technology Series HITS
- Engineering Your Future Project Activities
- Technology Student Association Curriculum Resources Guide for Middle School and High School Events.

TECHNOLOGICAL SYSTEMS

STANDARD 4.0

Learn how to interact with technological systems.

LEARNING EXPECTATIONS

The student will be able to:

- 4.1 Understand how technological systems work.
- 4.2 Read an owner's manual for a given system and list proper maintenance procedures found in technical manuals.
- 4.3 Design and build a structural system.

PERFORMANCE STANDARDS:

The student should know and be able to:

- 4.1.1 Accurately sketch a specific technological device.
- 4.1.2 Diagram and list the steps for operating a technological system.
- 4.2.1 Outline proper maintenance procedures found in technical manuals.
- 4.3.1 Design a structural system using proper technical drawing skills.
- 4.3.2 Use tools, materials, and machines safely to fabricate a simple system.
- 4.3.2 Build a structure to hold the most load with the least amount of materials.
- 4.3.3 Test and critique your structural system.

SAMPLE PERFORMANCE TASKS:

- Design a structural system that consists of a variety of parts. When these parts work together, they resist force. All design instructions are located on Pgs. 65—67.
- Students will review their structures load and record all test results on the Data Analysis sheet located on Pg. 68.
- Students will select one of the devices listed on page 50. Sketch and submit their device on graph paper or sketch pad located on page 51. They will label its parts and their functions, and list the steps in using it to complete the designed task. Describe what could happen if the steps are not performed in the correct order. Pgs. 52-53

INTEGRATION/LINKAGES

- International Technology Education Association – Center to Advance the Teaching of Technology and Science (ITEA-CATTS)
- Tech-Know Project Middle School Teacher's Guide A
- Tech-Know Project Middle School Teacher's Guide B
- Human Innovation Technology Series HITS
- Engineering Your Future Project Activities
- Technology Student Association Curriculum Resources Guide for Middle School and High School Events.

TECHNOLOGICAL SYSTEMS

STANDARD 5.0

Analyze how technological systems evolve.

LEARNING EXPECTATIONS

The student will be able to:

- 5.1 Understand how to integrate technological systems.
- 5.2 Understand how a telegraph works.
- 5.3 Explain how to take an invention and innovate this product to meet the current trends.

PERFORMANCE STANDARDS:

The student should know and be able to:

- 5.1.1 Combine two or more technologies to make a new technology.
- 5.1.2 Describe how the parts of a system are going to work together.
- 5.1.3 Use tools to process materials into a useful technological system.
- 5.2.1 Research the invention of the telegraph.
- 5.3.1 Explain what it means to innovate.

SAMPLE PERFORMANCE TASKS:

- Design, build, and test an electromagnet to perform a specific operation.
- Develop a time line of communication systems from the telegraph to present Flip Camera.

INTEGRATION/LINKAGES

- International Technology Education Association – Center to Advance the Teaching of Technology and Science (ITEA-CATTS)
- Tech-Know Project Middle School Teacher’s Guide A
- Tech-Know Project Middle School Teacher’s Guide B
- Human Innovation Technology Series HITS
- Engineering Your Future Project Activities
- Technology Student Association Curriculum Resources Guide for Middle School and High School Events.

TECHNOLOGICAL SYSTEMS

STANDARD 6.0

Explore and demonstrate systems adjustments.

LEARNING EXPECTATIONS

The student will be able to:

- 6.1 Use tools, materials and machines to safely assemble and fabricate a transportation system according to specifications.
- 6.2 Predict the adjustments needed to obtain a specific, desired output.

PERFORMANCE STANDARDS:

The student should know and be able to:

- 6.1.1 Use tools, materials and machines to safely assemble and fabricate a transportation system according to specifications.
- 6.2.1 Predict and record the distance, rate and time your transportation device will travel.
- 6.2.2 Demonstrate clear ability to adjust your system for optimum results.

SAMPLE PERFORMANCE TASKS:

- Students may fabricate a transportation system such as a foam or balsa model glider, a rocket, a kite, a dragster vehicle, a mouse trap vehicle, etc.. This transportation system will be designed, sketched, and manufactured according to specifications.

INTEGRATION/LINKAGES

- International Technology Education Association – Center to Advance the Teaching of Technology and Science (ITEA-CATTS)
- Tech-Know Project Middle School Teacher’s Guide A
- Tech-Know Project Middle School Teacher’s Guide B
- Human Innovation Technology Series HITS
- Engineering Your Future Project Activities
- Technology Student Association Curriculum Resources Guide for Middle School and High School Events.

TECHNOLOGICAL SYSTEMS

STANDARD 7.0

Understand how to analyze and correct a system's failure.

LEARNING EXPECTATIONS

The student will be able to:

- 7.1 Learn how the integrity of a system is equally dependent on all of the parts that make up the system.
- 7.2 Explore the cause's system failure and diagnose, troubleshoot, and propose corrective measures for malfunctioning systems.

PERFORMANCE STANDARDS:

The student should know and be able to:

- 7.1.1 Predict causes of system failure.
- 7.1.2 Identify consequences of system failure.
- 7.2.1 Identify a familiar system that has failed to perform its tasks as designed.
- 7.2.2 Inspect, replace, and test parts that are determined to be malfunctioning.
- 7.2.3 Identify alternative for preventing a system failure.

SAMPLE PERFORMANCE TASKS:

- Research a product that was considered a failure or has caused a catastrophe, such as the BP oil spill. Describe the product or company failure verbally, in writing, or graphically. Students can develop visuals or models and present their findings.
- Students can identify and research a specific environmental problem or issue that has been influenced by advancements in technology. Identify the system failure and explain how to redesign this product to become a success. Students present their findings in the form of a multimedia presentation. The TSA Environmental Focus Contest can be used for this task.

INTEGRATION/LINKAGES

- International Technology Education Association – Center to Advance the Teaching of Technology and Science (ITEA-CATTS)
- Tech-Know Project Middle School Teacher's Guide A
- Tech-Know Project Middle School Teacher's Guide B
- Human Innovation Technology Series HITS
- Engineering Your Future Project Activities
- Technology Student Association Curriculum Resources Guide for Middle School and High School Events.

TECHNOLOGICAL SYSTEMS

STANDARD 8.0

Recognize and forecast trends in the development of technological systems.

LEARNING EXPECTATIONS

The student will be able to:

- 8.1 Select a common activity that requires the use of a technological system and predict how systems may change in the future with regard to trends.
- 8.2 Explain how the developmental trends of how specific technological systems have changed over time.

PERFORMANCE STANDARDS:

The student should know and be able to:

- 8.1.1 Describe how technological systems have become more complex in design and less complex to use.
- 8.2.1 Research and document the events relating to the evolution of a chosen system.
- 8.2.2 Conduct interviews and record information in a complete and easy to understand format.

SAMPLE PERFORMANCE TASKS:

- Prepare and deliver an extemporaneous debate style presentation, with team members explaining opposing views of a how a specific technology trend has change your life over the past few years. TSA Challenging Technology Issues contest.

INTEGRATION/LINKAGES

- International Technology Education Association – Center to Advance the Teaching of Technology and Science (ITEA-CATTS)
- Tech-Know Project Middle School Teacher’s Guide A
- Tech-Know Project Middle School Teacher’s Guide B
- Human Innovation Technology Series HITS
- Engineering Your Future Project Activities
- Technology Student Association Curriculum Resources Guide for Middle School and High School Events.